



Interferometry Science Center

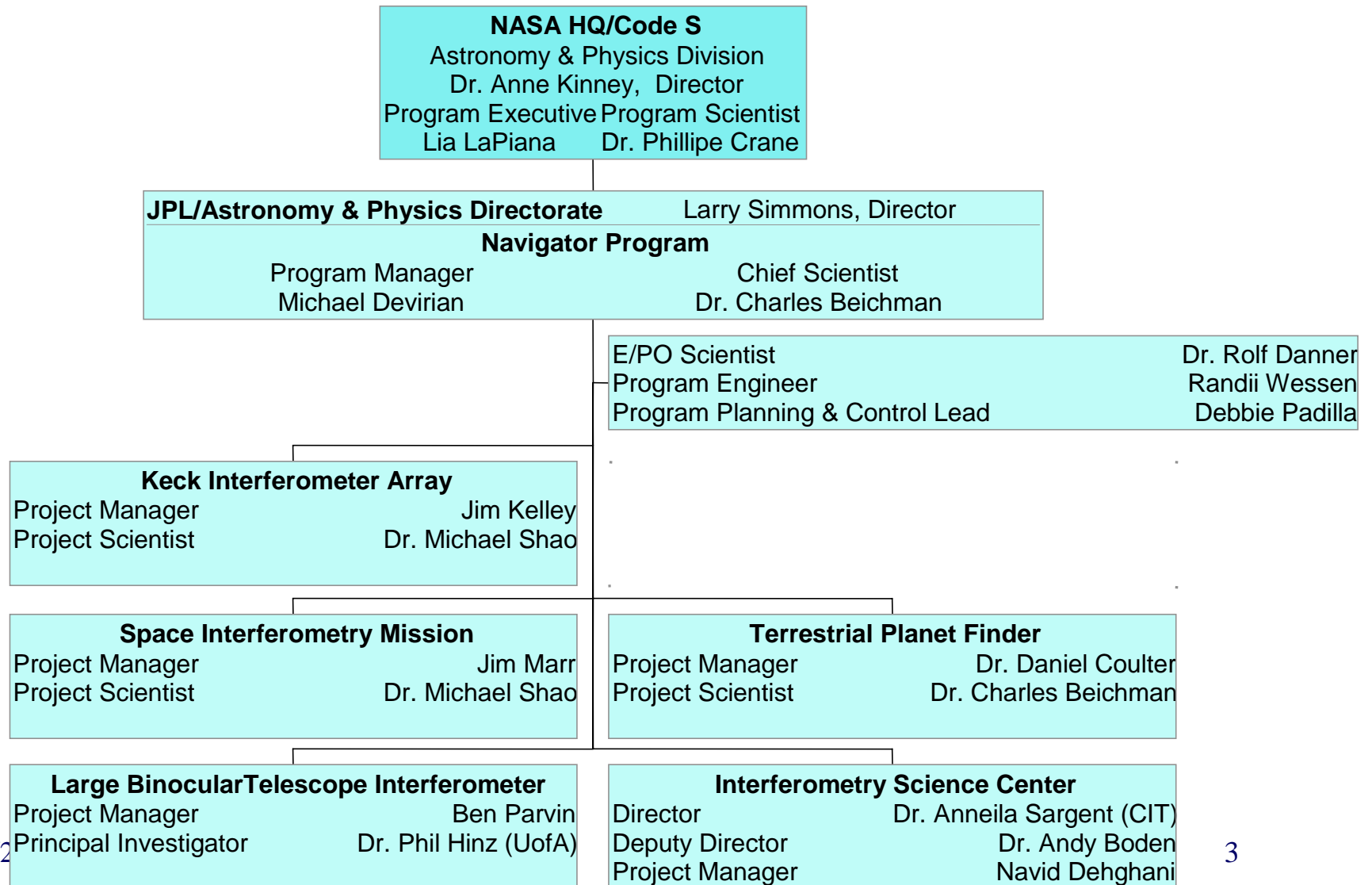
R. Akeson and A. Boden

Outline

- Role of ISC
- Overview of non-project specific tools
 - getCal planning tool
 - External calibration tools
- Update on tool distribution
- Areas for collaboration



Navigator Program Organization





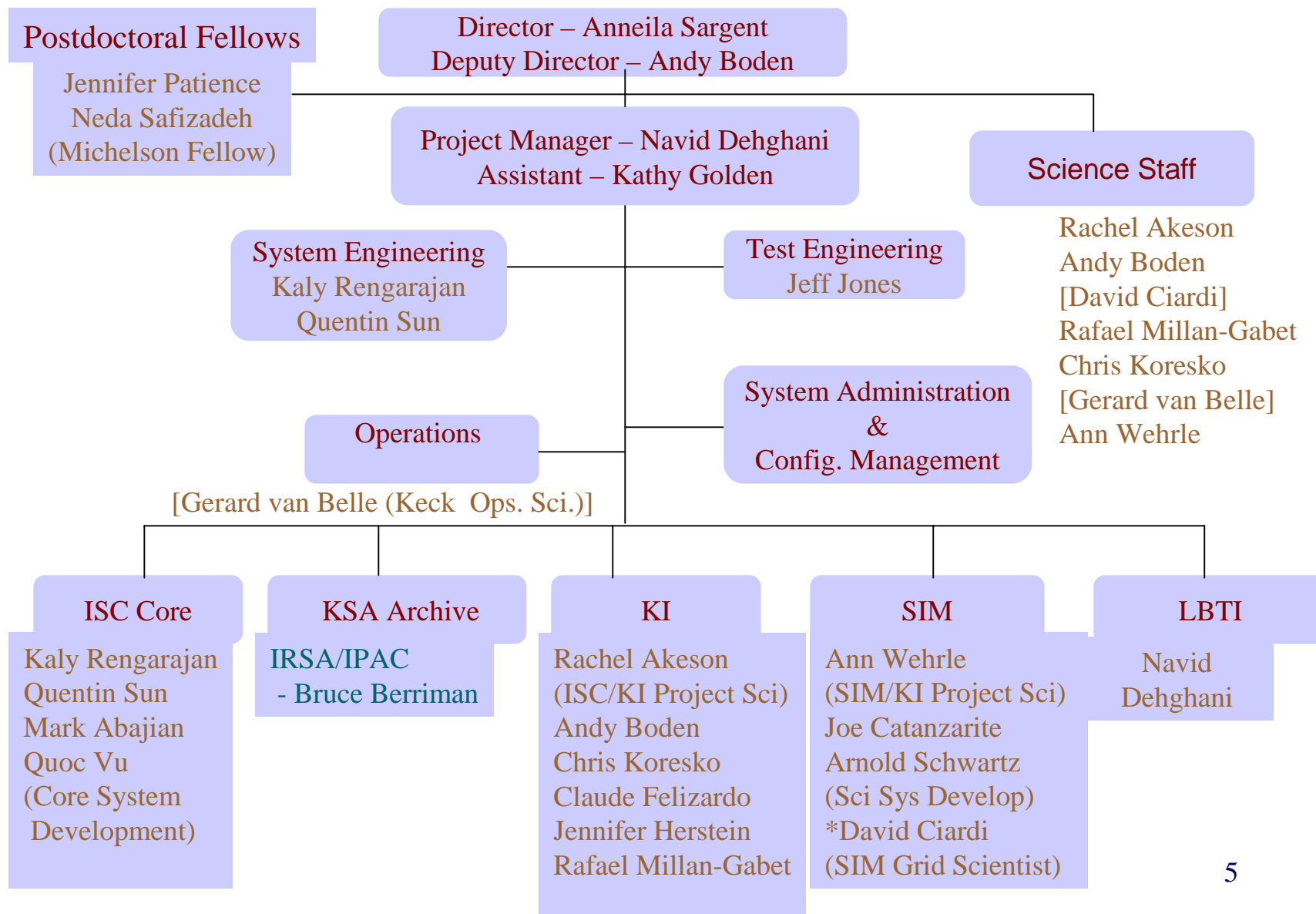
ISC Mission

ISC is a service organization created to facilitate the timely and successful accomplishment of the science objectives of NASA *Origins* program interferometers. Goals include:

- assist the scientific community in deriving meaningful scientific results using observations from these missions and facilities.
 - cultivate a broad user community and increase the awareness of scientific opportunities provided by the missions.
 - archive mission observations for continuing scientific use
-
- Currently supported projects are KI, SIM, LBTI (NASA time), TPF



ISC Staff





ISC V² End-User Tools

- Observation Planning: getCal
- L-2 (External) Data Calibration: wbCalib & nbCalib

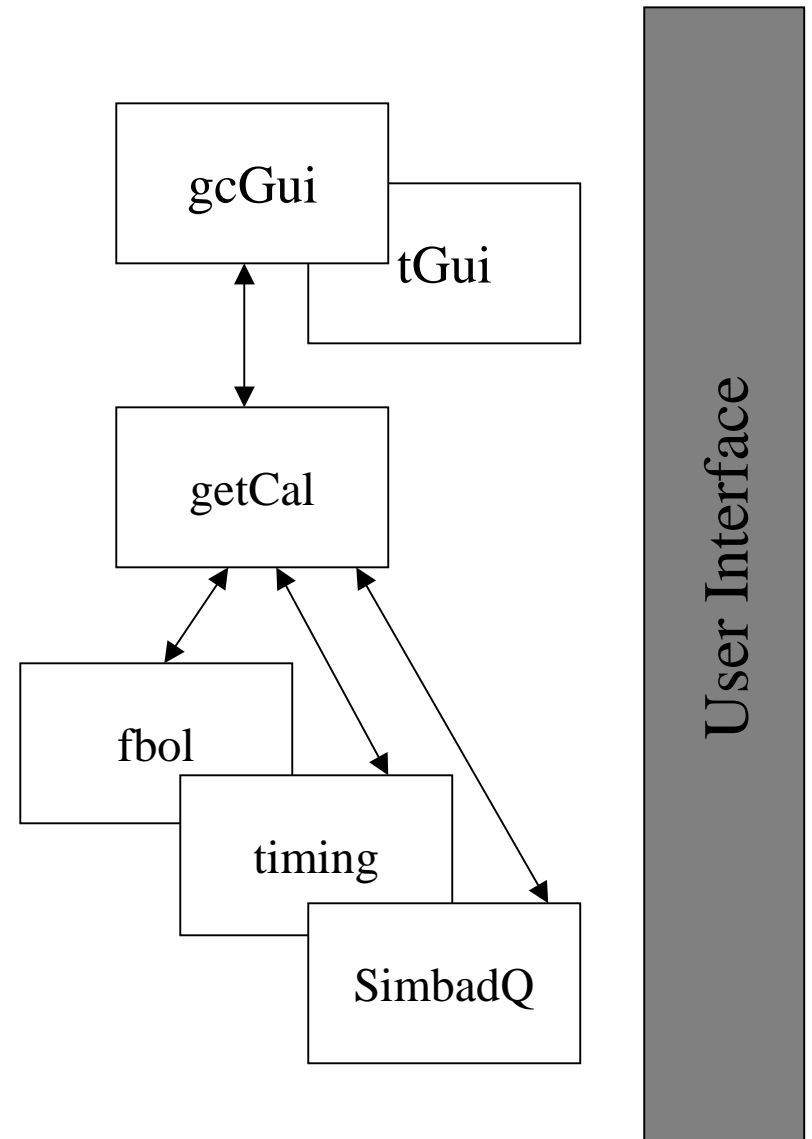


Key Features of getCal

- getCal is a PTI-Heritage Experiment/Observation Planning Tool That:
 - Resolves astronomical designations into standardized catalog entries and astrometry (via Simbad)
 - Identifies potential visibility calibration sources according to various observational and/or astrophysical criteria
 - Retrieves broad-band photometry from archival (Simbad, Catalog of Infrared Observations) sources and models spectral energy distribution (SED) with effective temperature/bolometric flux/angular diameter parameters
 - Computes observing accessibility and geometry according to various constraints
 - Includes various GUIs that facilitate access to components

getCal Design Overview

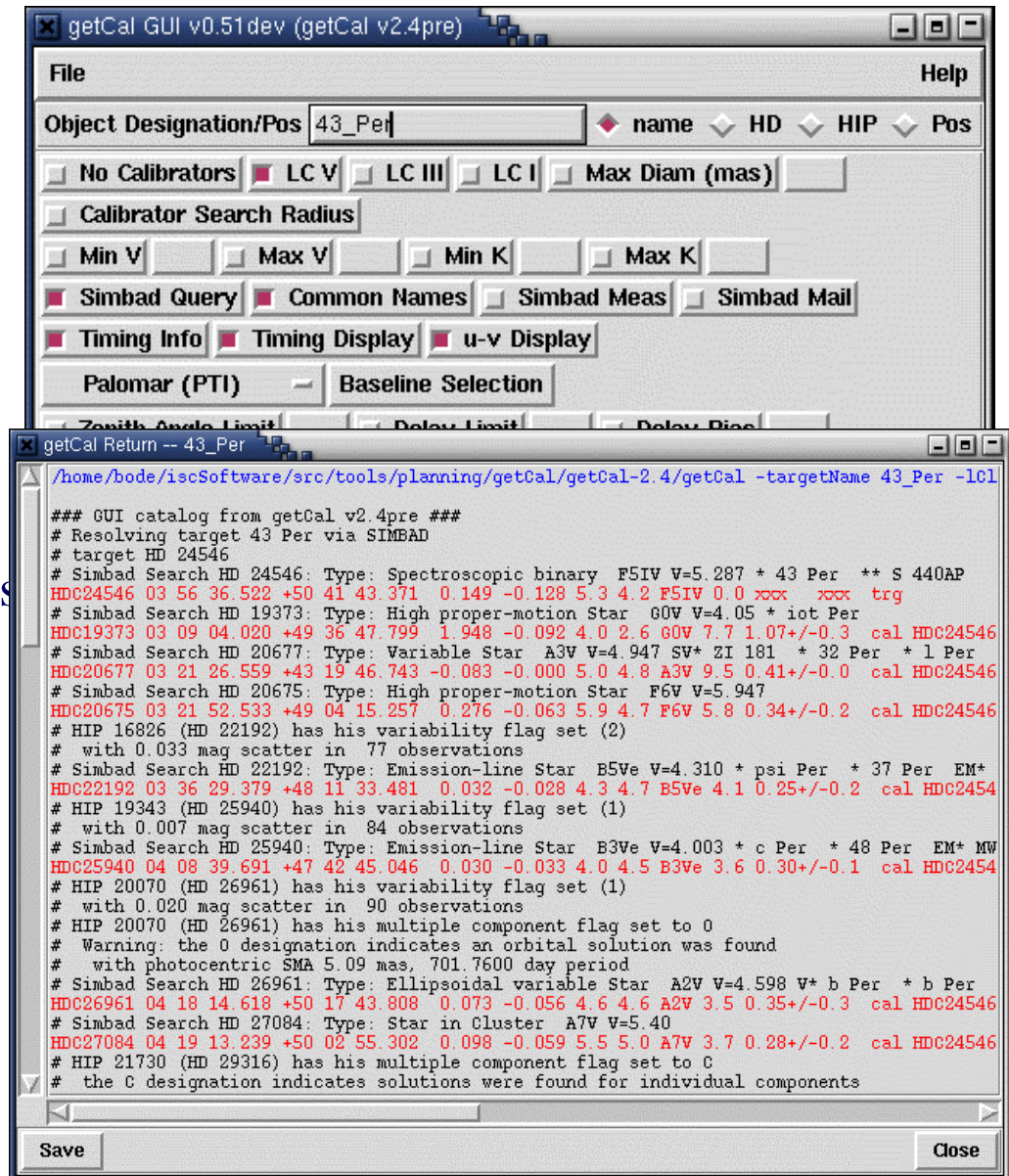
- getCal is designed as multi-layer toolset
 - GUI level – GUIs that interface with command-line tools the facilitate interface or present results (e.g. gcGui, tGui)
 - Wrapper level – top-level scripts that provide consolidated functionality with command-line interface (e.g. getCal, gcList)
 - Component level – individual components that implement individual functions (e.g. Hipparcos catalog “cone search”, Simbad name resolution & information retrieval, accessibility calculations)
- Script (perl) implementation to enhance portability





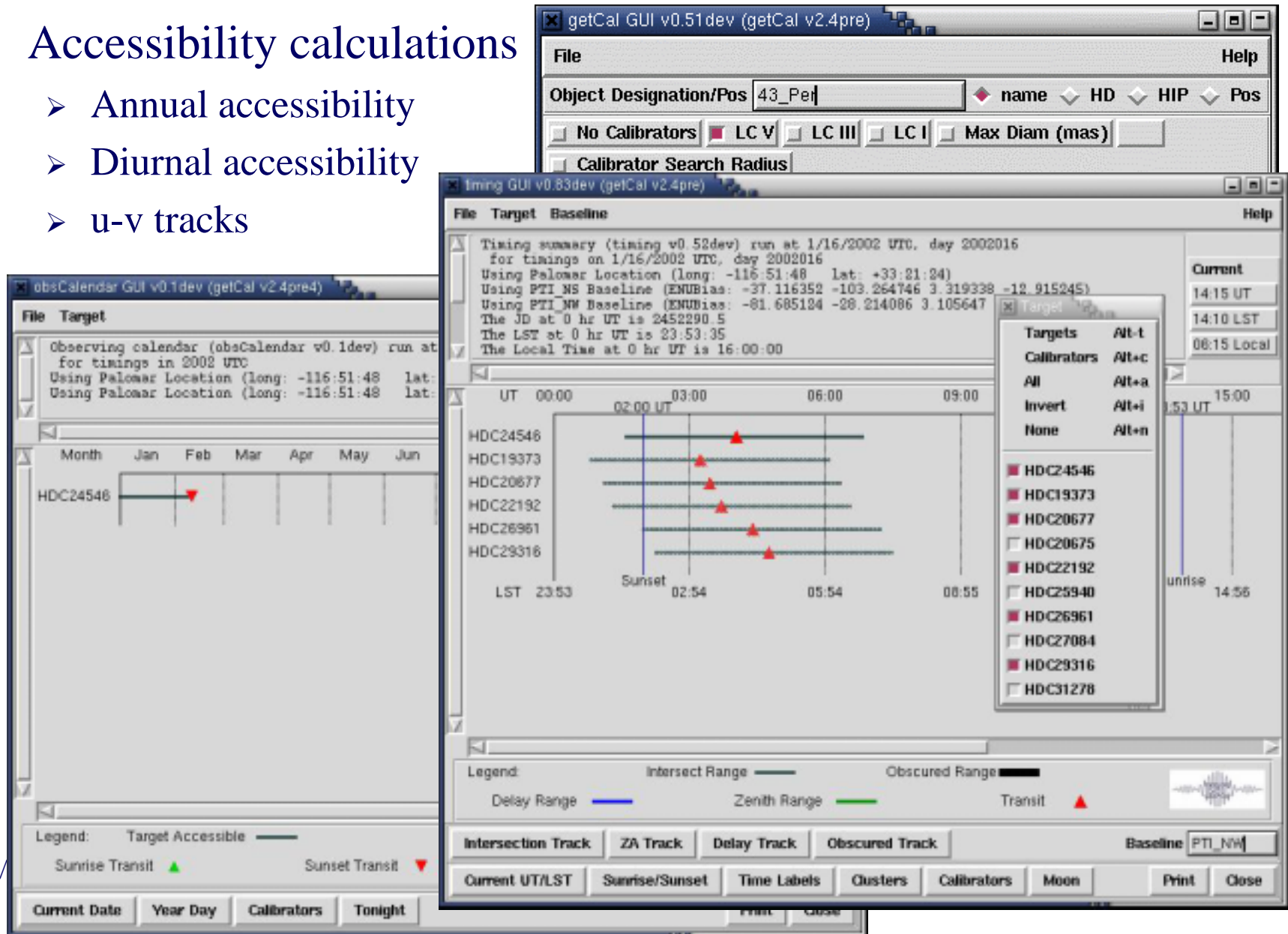
Illustrative Use Cases (1)

- Identify Candidate Calibrators for Given Source
 - Geometric search
 - Magnitude constraints
 - Astrophysical constraints (e.g. luminosity class, apparent diameter)
 - Multiplicity vetting



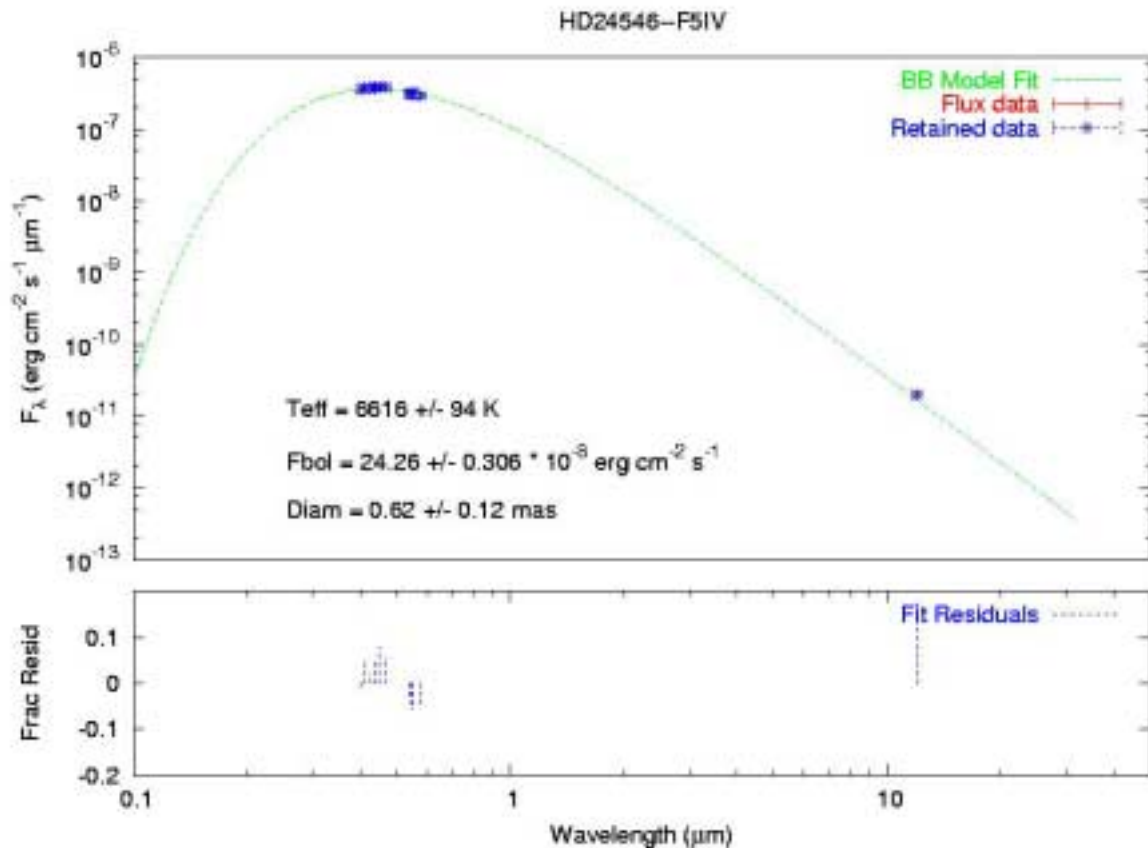
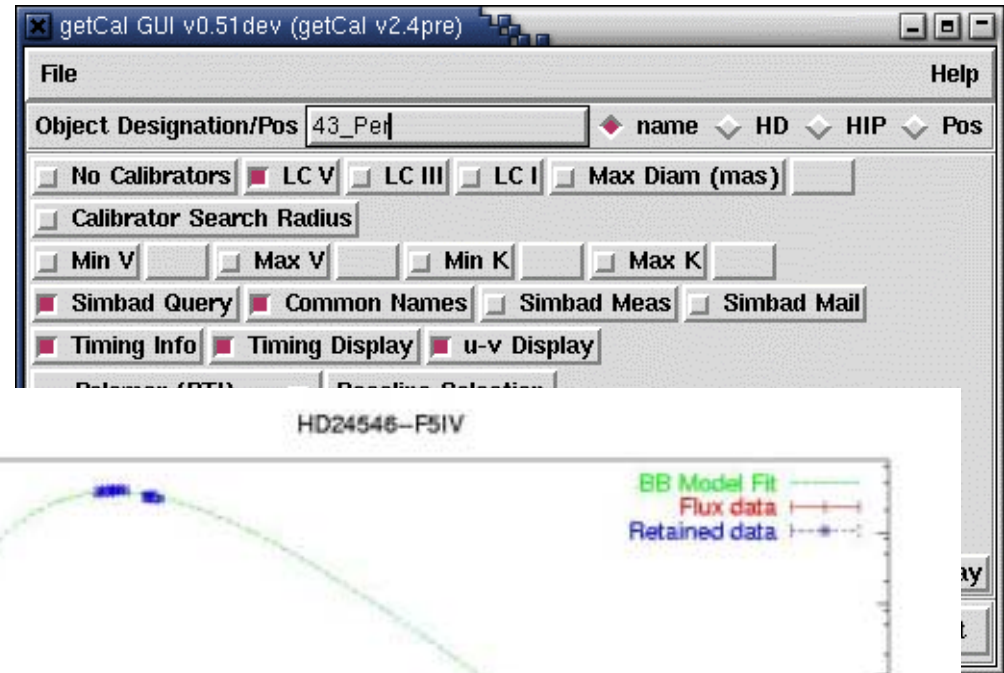
Illustrative Use Cases (2)

- Accessibility calculations
 - Annual accessibility
 - Diurnal accessibility
 - u-v tracks



Illustrative Use Cases (3)

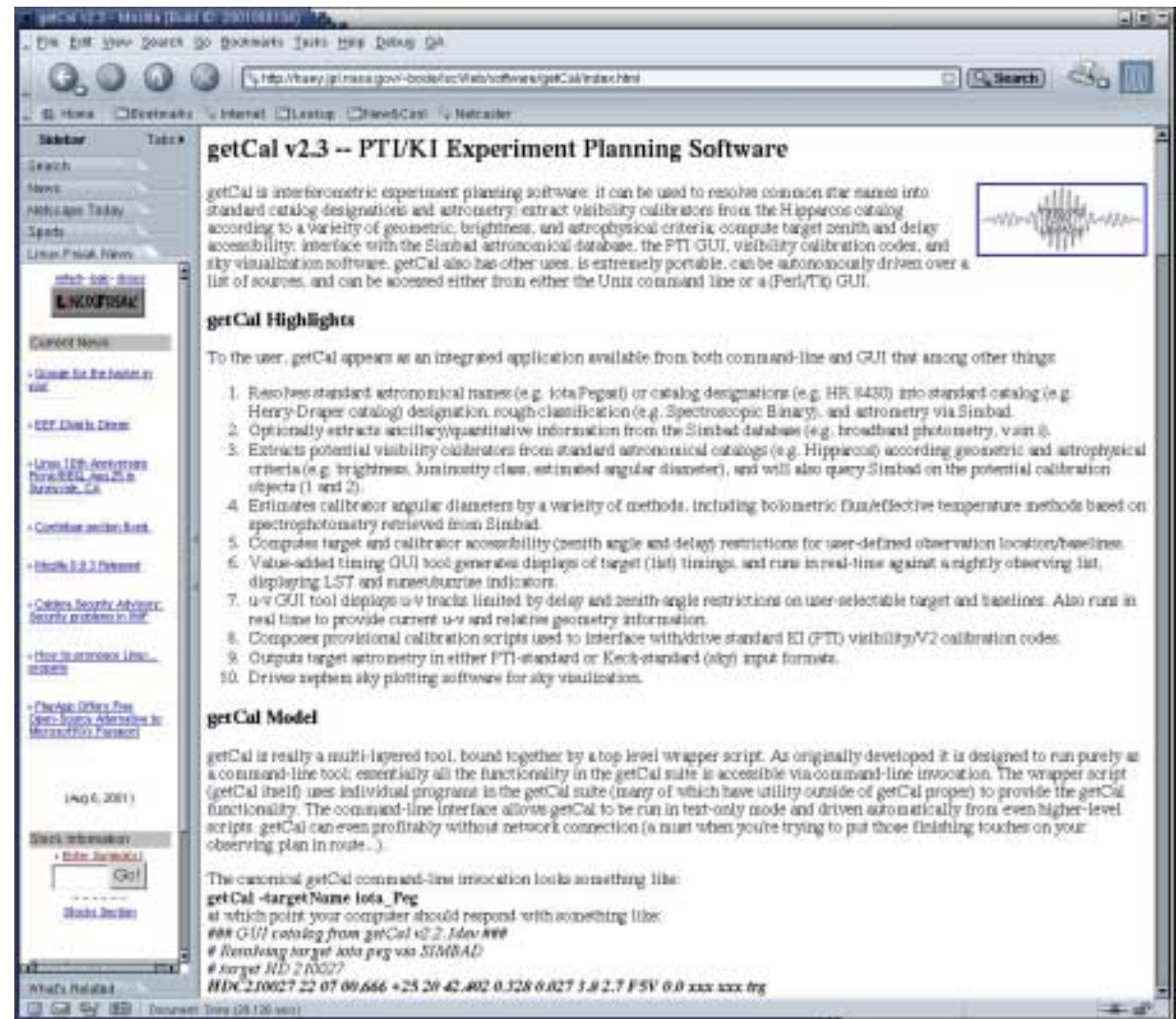
- Spectral Energy Distribution/Bolometric flux – effective temperature modeling



getCal Documentation



- getCal documentation is on-line at isc.caltech.edu



<http://isc.caltech.edu/software/getCal>



External Calibration Applications

- PTI-Heritage wbCalib & nbCalib are *external* visibility amplitude (V^2) calibration applications
- wbCalib & nbCalib produce “externally calibrated” visibility data products – estimates of visibility measured by ideal interferometer
 - u-v points for calibrated visibilities
- wbCalib & nbCalib are the entry point to astrophysical modeling of visibilities
- Testing criteria based on external comparisons with other astronomical results (e.g. binaries, stellar diameters)



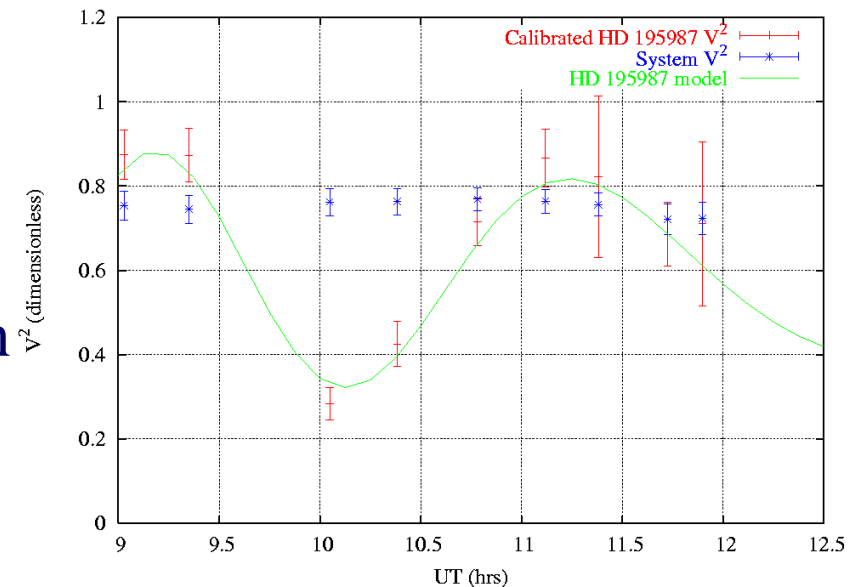
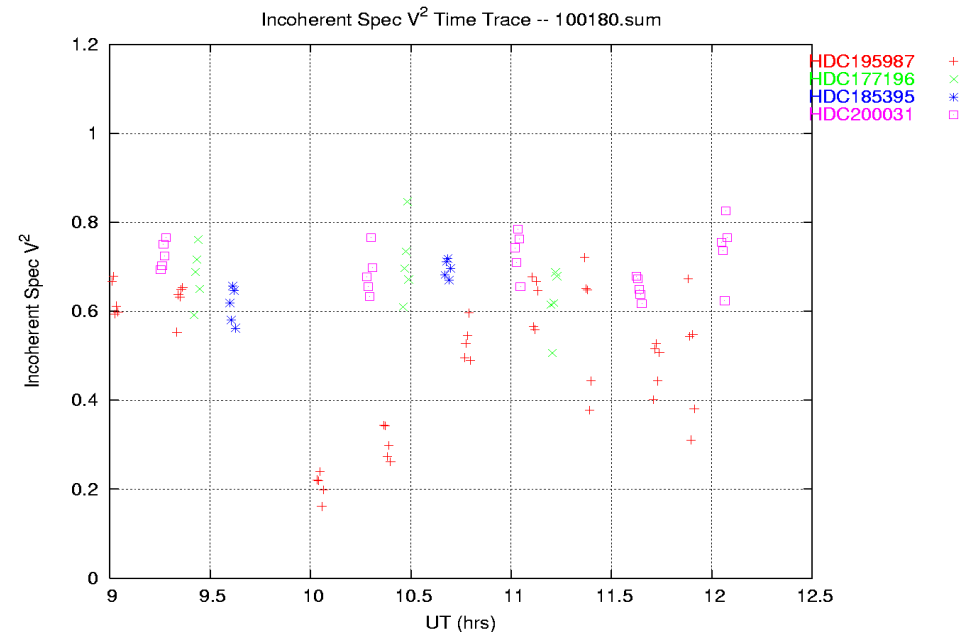
Key Features of Calibration Applications

- Common Command-Line Interface
 - I/O
 - Option flags
- Input:
 - Calibration script defining calibration targets and reference objects (ASCII)
 - L-1 data format (PTI & KI -- ASCII)
- Output:
 - ASCII output format (stdout)
 - FITS output format (through separate filter)
- Processing:
 - Identification of “pertinent” calibration observations
 - Modeling of scalar “system visibility” (on baseline basis)
 - Application to target scans
 - Delay value checking and computation of u-v geometry

Illustrative Use Case

- Standard invocation
wbCalib cs.hd195987 100180.sum
- Identification of Calibration Sources
- Consolidation of Data Points into “Scans”
- Modeling and Application of System Visibility

8/29/2002



wbCalib & nbCalib Documentation



<http://isc.caltech.edu/software/wbCalib>

<http://isc.caltech.edu/software/nbCalib>



Update on tool availability

- Recent permission from Caltech to distribute getCal and external calibration applications (wbCalib/nbCalib)
 - Plan to extend to all applications
- Packages will be available to ALL interested users via a web download interface
 - Expected availability - November
 - Check web site isc.caltech.edu for updates

Areas for collaboration

- getCal extensions
- Data fitting/modeling routines for externally calibrated (Level 2) data
- FITS format for data exchange
- Calibration sources



getCal extensions

- The standard getCal distribution contains the location and baseline information for PTI, KI, NPOI, CHARA and VLTI
 - A mechanism could be added for including user specified locations and baseline
- Currently calibrator searches are done using the Hipparcos catalog
 - Working on including access to the Tycho2 and 2MASS point source catalog
 - Defined interface for including other catalogs



Graphical interfaces to tools

- The tools presented here are command line based and modular
 - GUI tools are a separate layer – could have multiple GUI tools if desired
 - Example: calGui is a prototype GUI for plotting data and running wbCalib
 - ❖ Other users might want different functionality in a GUI or a different look (we use mostly perlTk) to match other tools



Data modeling and fitting tools

- After data have been externally calibrated, often the next step is producing fits or models
 - Uniform brightness disk, Gaussian, binary etc.
- As instrument specifics have been removed, these tools could work on data from many instruments
- ISC plans to develop fitting tools with same design philosophy
 - Modular routines with separate calculation and graphics components
- If a flexible set of underlying routines were developed, they could be used by many groups
 - Question: Are there already packages in use that the OIR interferometry community should consider using? (aips++, IRAF, ??)



FITS data exchange

- Per community agreement, FITS is a good mechanism for exchange of externally calibrated data
- ISC has prototype routines to write both calibrated and uncalibrated data to FITS files
 - Includes keywords from draft standard



Calibrators

- ISC has started to accumulate a list of calibrator sources used at PTI and KI
 - Will be available on web page